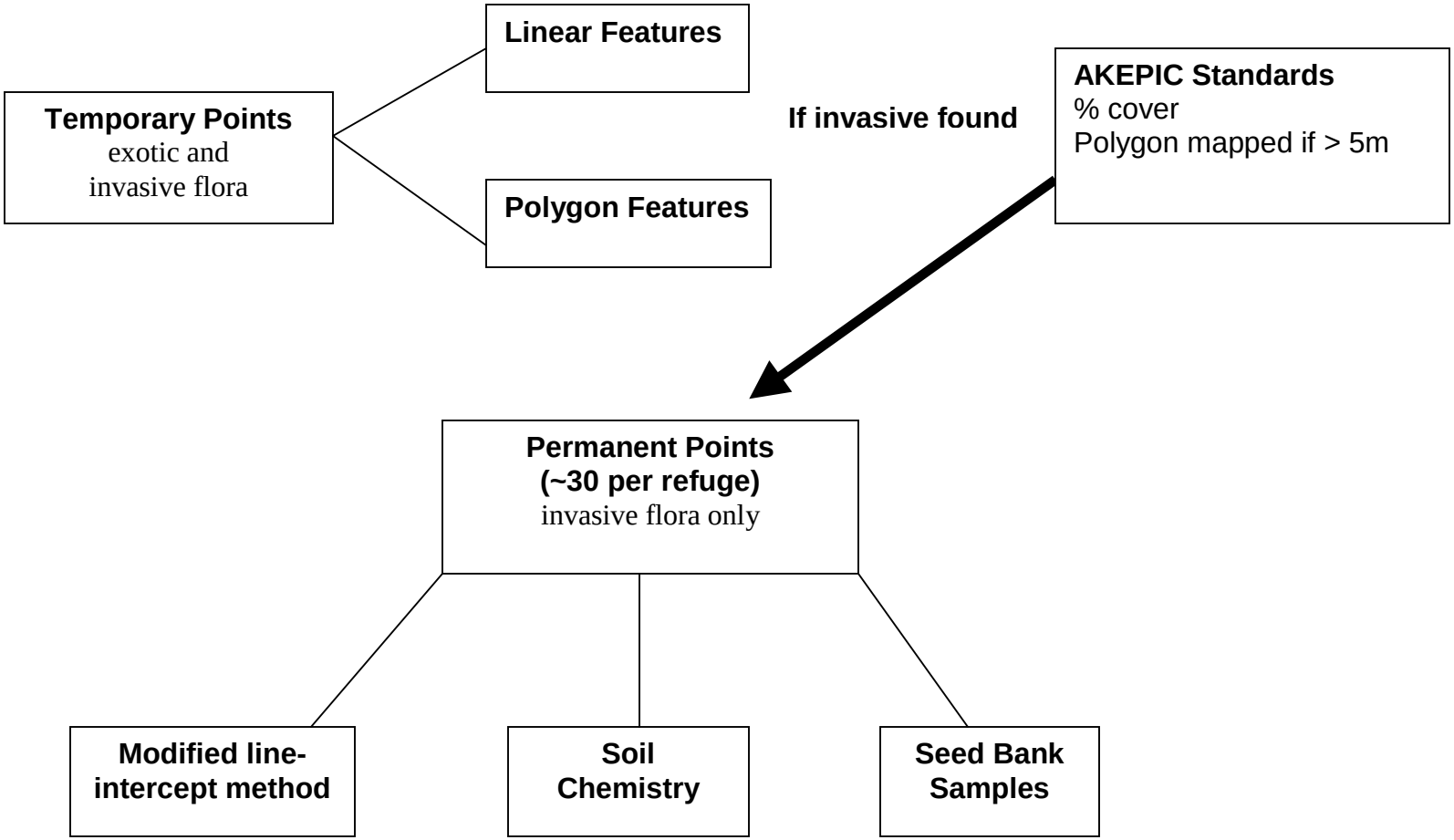
Draft BAER Invasive Plant Monitoring Method



Draft BAER Invasive Plant Monitoring Methods

Following severe Alaskan wildfires in 2004, an interagency plan was drafted to provide stabilization and mitigation for fires and suppression activities (BAER, 2004). Following a vegetation resource assessment, recommendations were made to federal entities to monitor and control the spread and proliferation of invasives as a result of fires and associated control efforts.

One objective of the following rehabilitation plan was to "Evaluate the potential for invasive plant species introduction or encroachment into native plant communities within, and adjacent to, fire areas and along travel ways."(BAER, 2004). A task order was promulgated under the Pacific Northwest Cooperative Ecosystem Studies Unit Network (CESU) with the University of Alaska-Anchorage's Natural Heritage Program to complete this work on Alaskan refuges for FY05. The objectives are as follows:

1. Locate, describe and remove invasive plant populations at sites associated with the 2004 fire season.
2. Survey selected sites to determine the presence/absence of non-native plant species.
3. Define the extent, threat, and density of documented invasive plants.
4. Remove all invasive plants that can be hand-pulled or cut from sites.
5. Analyze and report results and identify pathways of introduction and spread where possible. (CESU agreement #10100-0-J001)

The following describes a proposed adaptive sampling methodology to assess the impact of wildfire on the introduction and spread of invasive flora:

1. Temporary Sampling Plots

Temporary plots are intended to provide quick, systematic and extensive survey coverage of the disturbance and occurrence of exotic and invasive flora. Locations of each transect will be recorded with Global Positioning System (GPS) units. For all surveys, if a target species (see attached list – "Recorded in Alaska") is located, data will be collected commensurate with AKEPIC standards including: GPS location of infestation centroid (or infestation polygon if greater than 5m diameter), acreage/cover estimated and habitat type (http://akweeds.uaa.alaska.edu/pdfs/akepic_manual_05_final.pdf).

1.1 Linear Features

For linear features such as roads, allotments, dozer lines, airstrips: A 2x10m belt transect will be established every 0.5 mi (0.8 km) perpendicular to the feature. Frequency will be determined by presence/absence of target species recorded in meter square quadrats on each side along the transect length.

1.2 Polygon Features

For all polygon features (e.g., staging areas, helispots) the disturbance will be surveyed using a time-defined search of the area. The surveyor will search selected areas for target species for 10 minutes per acre. Due to the irregular shape of developed campgrounds, they will be assessed on a case-by-case basis.

2. Permanent Sampling Plots

Permanent plots (100 m^2) will placed within areas containing identified invasive flora (Appendix 1, "Alaskan invasive"): the center of each plot will be recorded and permanently marked (see Section 3.3: Site Monuments). ; All vascular flora within 5 m of plot center (78.5 m^2) will be identified and recorded. Vegetation community type to at least Level IV (Level V preferred; Viereck *et al*. 1992) will be recorded at both the plot and surrounding landscape level (900 m^2) In addition, the percent cover, height and DBH of overstory woody vegetation will be recorded (Fig. 1; Appendix 4).

2.1 Vegetation Sampling

Herbaceous and woody vegetative cover within the first 2 m above ground will be sampled using a modified point-intercept sampling technique (Dunn 1992).

→ IF INFESTATION <u>IS LESS</u> THAN 5 m DIAMETER

- Four 5-meter long transects (Fig 1) will be established along cardinal compass directions (corrected for declination) from the plot center using tightly-woven, braided nylon cord (5mm-diameter) marked at 0.25-m intervals [laid to follow ground contour].

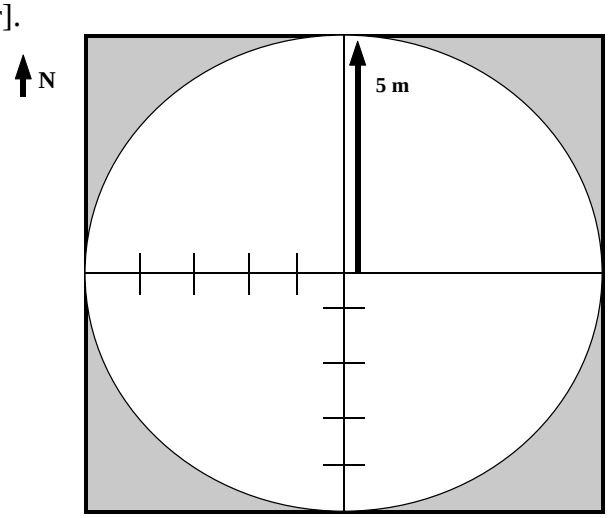


Fig 1: *Landcover classification area (10x10 m) with permanent lot layout inset. Soil and seed bank sampling in shaded areas outside 5 m circular plot.*

- A 2m-long 13mm-diameter steel rod, marked at 1m to separate the vertical column into two strata, will be used as a sampling pin that is dropped vertically at each sampling point.

- Each plant taxon that touches the sampling pin one or more times is recorded by stratum at each sampling point (*n* =80); only 1 hit/stratum/ point/taxon is recorded. If no vegetation touches the sampling pin within stratum, then NO PLANTS RECORDED should be recorded. Consequently, a minimum of 40 tallies should be recorded/stratum; the number of tallies recorded can exceed this value considerably depending on species richness.

  Substrate categories are
  - BARE GROUND,
  - ROCK,
  - LITTER,
  - DEAD WOOD (>25mm diameter),
  - WATER, SNOW/ICE,
  - ASH/CHARCOAL (*i.e.*, burned), and
  - LIVE VEGETATION.

  If a dead wood fragment/stick is less than 25 mm in diameter or width, then it should be recorded as LITTER. Rock particles <13mm in longest dimension are recorded as BARE GROUND; ≥ 13mm are recorded as ROCK. Any live vegetation recorded as a substrate should also be recorded by species in the 1-m stratum. The total number of substrates recorded should always equal 20 per transect (80 per plot).

→ IF INFESTATION IS GREATER THAN 5 m DIAMETER

A straight-line transect will be aligned with the longest axis of the infestation and assessed via the point-intercept method described above. The points along the transect will be evenly distributed such that no greater than 100 sampling points will be on each transect. Each end of the straight-line transect will also be properly monumented (see Section 3.3: Site Monuments).

2.2 Soil Samples

- After all litter is removed, two soil samples (2.5 cm x 15 cm depth) will be collected with a coring device (Fig 3) at four sites within all permanent plots (Fig 1). Samples will be pooled into one composite sample.

- The samples will be analyzed for texture (percent sand, silt, and clay), total N and C, and other nutrients where appropriate" (Stohlgren et al, 2002). Suggested add-on: soil density or other equivalent compaction metric.

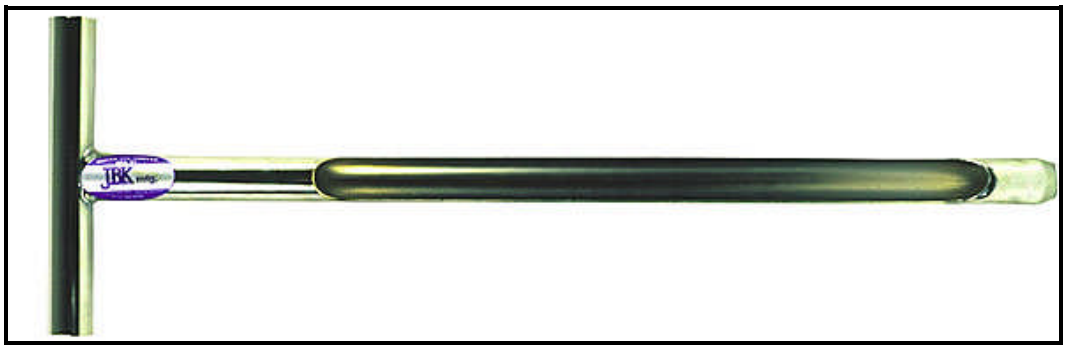


Fig 3*: Soil probe for collection of soil samples*

2.3 Seed Bank Samples

- Samples will be collected from a series of trenches (10 cm depth x 20 cm width) dug at the soil surface within plots (Fig 1).

- Samples will be dried and sieved to separate seeds, which will be identified to species if possible. Some seeds may need to be germinated to confirm species identity.

2.4 Site Monuments

- Suitable site markers (rebar, fiberglass, aluminum rods) will be driven into plot center (for permanent plots) flush with substrate. For line transects each end of the transect should be similarly monumented.

2.5 Site Photographs

Two stereo pictures are taken across the permanent center point looking South to North. If the vegetation, topography, or lighting will cause an unsatisfactory picture, the picture may be taken in any cardinal direction.

- The photographer will stand 5.64m to the South of plot center and the other observer will stand 5.64m to the North. The photos are taken across the plot with the observer centered in the frame.

- Note which part of the subject falls in the center of the frame and move the camera horizontally to the right (don't move it up or down) approximately 2 decimeters and take the second photo with the same part of the subject in the viewfinder (photos may be taken in a vertical format to capture taller subjects).

3. References:

BAER. 2004 Alaska Fires Burned Area Emergency Stabilization and Rehabilitation Plan.U.S. Department of the Interior, Bureau of Land Management, National Park Service, State of Alaska Department of Natural Resources, Division of Forestry, State of Alaska Department of Transportation, Tanana Chiefs Conference, Doyon LTD. (http://www.ak.blm.gov/baer/) accessed March, 2005.

Dunn, P. 1992. Long-term biological resource and threat monitoring of Hawaiian Natural Areas. Produced for the Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, by The Nature Conservancy of Hawaii. Honolulu, HI.

Stohlgren, T., Barnett, D. & Simonson, S. 2002. Beyond North American Weed Management Association Standards. (http://www.nawma.org/documents/Mapping Standards/BEYOND NAWMA STANDARDS.pdf) accessed March, 2005.

APPENDIX 1

EXOTIC PLANT

TARGET SPECIES LIST

CODE	Latin Name	Recorded in Alaska	Alaskan invasive	state noxious	federal noxious	Common Name
ACPT	Achillea ptarmica	x				sneezeweed
ACRE3	Acroptilon repens					hardheads
AECY	Aegilops cylindrica					jointed goatgrass
AEGIN	Aeginetia				x	aeginetia
AGAD2	Ageratina adenophora				x	sticky snakeroot
AGCR	Agropyron cristatum	x				crested wheatgrass
AGSM	Agropyron smithii					
AGCA5	Agrostis capillaris					colonial bentgrass
AGGI2	Agrostis gigantea	x				redtop
AGST2	Agrostis stolonifera					creeping bentgrass
AGTE	Agrostis tenuis	x				
ALECT2	Alectra				x	alectra
ALMA12	Alhagi maurorum					camelthorn
ALPS3	Alhagi pseudalhagi					
ALPE4	Alliaria petiolata	x	x			garlic mustard
ALGE2	Alopecurus geniculatus	x				water foxtail
ALPR3	Alopecurus pratensis	x				meadow foxtail
ALSE4	Alternanthera sessilis				x	sessile joyweed
AMRE	Amaranthus retroflexus	x				redroot amaranth
ANAR6	Anthemis arvensis					corn chamomile
ANCO2	Anthemis cotula	x				stinking chamomile
ANTI	Anthemis tinctoria					golden chamomile
ANOD	Anthoxanthum odoratum	x				sweet vernalgrass
ANOR2	Antirrhinum orontium					
ARGL	Arabis glabra	x				tower rockcress
ARAN7	Argentina anserina					silverweed cinquefoil
ARAB3	Artemisia absinthium					absinthium
ASPR	Asperugo procumbens					German-madwort
ASFI2	Asphodelus fistulosus				x	onionweed
ASCI4	Astragalus cicer	x				cicer milkvetch
AVFA	Avena fatua	x		x		wild oat
AVST	Avena sterilis				x	animated oat
AZPI	Azolla pinnata				x	feathered mosquitofern
BICE	Bidens cernua					nodding beggartick
BRJU	Brassica juncea			x		India mustard
BRNA	Brassica napus	x				rape
BRNI	Brassica nigra					black mustard
BRRA	Brassica rapa	x				field mustard
BRHO2	Bromus hordeaceus	x				soft brome
BRIN2	Bromus inermis	x				smooth brome
BRSE	Bromus secalinus					rye brome
BRTE	Bromus tectorum	x	x			cheatgrass
CASES	Calystegia ssp. Sepium	x				hedge false bindweed
CARA	Campanula rapunculoides	x				rampion bellflower
CABU2	Capsella bursa-pastoris	x				shepherd's purse
CAAR18	Caragana arborescens	x				Siberian peashrub

CODE	Latin Name	Recorded in Alaska	Alaskan invasive	state noxious	federal noxious	Common Name
CADR	Cardaria draba			x		whitetop
CAPU6	Cardaria pubescens			x		hairy whitetop
CAAC	Carduus acanthoides					spiny plumeless thistle
CANU4	Carduus nutans					nodding plumeless thistle
CADE9	*Carex deweyana					Dewey sedge
CAOX2	Carthamus oxyacantha				x	jeweled distaff thistle
CATA5	Caulerpa taxifolia				x	caulerpa
CEBI2	Centaurea biebersteinii	x	x			spotted knapweed
CECY2	Centaurea cyanus			x		garden cornflower
CEDET	Centaurea debeauxii ssp. thuillieri					meadow knapweed
CEDI3	Centaurea diffusa					white knapweed
CEPR2	Centaurea pratensis					
CERE6	Centaurea repens			x		
CESO3	Centaurea solstitialis					yellow star-thistle
CEFOV2	Cerastium fontanum ssp. vulgare	x				big chickweed
CEGL2	Cerastium glomeratum	x				sticky chickweed
CHAL7	Chenopodium album	x				lambsquarters
CHBE4	Chenopodium berlandieri	x				pitseed goosefoot
CHAC	Chrysopogon aciculatus				x	golden false beardgrass
CIIN	Cichorium intybus	x				chicory
CIAR4	Cirsium arvense	x	x	x		Canada thistle
CIVU	Cirsium vulgare	x	x			bull thistle
COLI2	Collomia linearis	x				tiny trumpet
COBE2	Commelina benghalensis				x	jio
COMA2	Conium maculatum					poison hemlock
COAR4	Convolvulus arvensis	x		x		field bindweed
COCO7	Cotula coronopifolia		x			common brassbuttons
COCO7	Cotula coronopifolia					common brassbuttons
CRTE3	Crepis tectorum	x	x			narrowleaf hawksbeard
CRVU2	Crupina vulgaris				x	common crupina
CUSCU	Cuscuta				x	dodder
CYOF	Cynoglossum officinale					gypsyflower
CYSC4	Cytisus scoparius	x	x			scotchbroom
DAGL	Dactylis glomerata	x	x			orchardgrass
DAST	Datura stramonium					jimsonweed
DACA6	Daucus carota					Queen Anne's lace
DESO	Delphinium sonnei	x				
DEBE2	Deschampsia berinensis	x				Berings tufted hairgrass
DECE	Deschampsia cespitosa	x				
DEEL	Deschampsia elongata	x				slender hairgrass
DESO2	Descurainia sophia	x				herb sophia
DIPU	Digitalis purpurea	x				purple foxglove
DIAB	Digitaria abyssinica				x	African couchgrass
DISC5	Digitaria scalarum				x	
DIVE2	Digitaria velutina				x	velvet crabgrass
DIFU2	Dipsacus fullonum					Fuller's teasel
DRAR7	Drymaria arenarioides				x	sandwort drymary
EIAZ2	Eichhornia azurea				x	anchored water hyacinth

CODE	Latin Name	Recorded in Alaska	Alaskan invasive	state noxious	federal noxious	Common Name
ELRE4	Elymus repens	x	x	x		quackgrass
ELSI	Elymus sibiricus	x				Siberian wildrye
ELTR7	Elymus trachycaulus	x				slender wheatgrass
EMAU	Emex australis				x	southern threecornerjack
EMSP	Emex spinosa				x	spiny threecornerjack
ERCI6	Erodium cicutarium					redstem stork's bill
ERGA	Erucastrum gallicum	x				common dogmustard
ERCH9	*Erysimum cheiranthoides	x				wormseed wallflower
EUCY2	Euphorbia cyparissias					cypress spurge
EUES	Euphorbia esula			x		leafy spurge
EUMY2	Euphorbia myrsinites					myrtle spurge
FEAR3	Festuca arundinacea	x				
FERU2	Festuca rubra	x				red fescue
GAOF	Galega officinalis				x	professor-weed
GABI3	Galeopsis bifida	x				splitlip hempnettle
GATE2	Galeopsis tetrahit	x	x	x		brittlestem hempnettle
GAPA2	Galinsoga parviflora			x		gallant-soldier
GEPU2	Geranium pusillum					small geranium
GLLE3	Glycyrrhiza lepidota	x				American licorice
GYPA	Gypsophila paniculata					babysbreath gypsophila
HAGL	Halogeton glomeratus					saltlover
HEAN3	Helianthus annuus	x				common sunflower
HEMA17	Heracleum mantegazzianum				x	giant hogweed
HEMA3	Hesperis matronalis					dames rocket
HIAU	Hieracium aurantiacum	x	x			orange hawkweed
HICA10	Hieracium caespitosum	x				meadow hawkweed
HIPI	Hieracium pilosella	x				mouseear hawkweed
HIUM	Hieracium umbellatum	x	x			narrowleaf hawkweed
HOMER	Homeria				x	Cape tulip
HOJU	*Hordeum jubatum	x	x			foxtail barley
HOMU	Hordeum murinum	x				mouse barley
HOVU	Hordeum vulgare	x				common barley
HYVE3	Hydrilla verticillata				x	waterthyme
HYPO3	Hygrophila polysperma				x	Indian swampweed
HYPE	Hypericum perforatum	x				common St. Johnswort
HYRA3	Hypochaeris radicata	x	x			hairy catsear
IMGL	Impatiens glandulifera	x				ornamental jewelweed
IMBR	Imperata brasiliensis				x	Brazilian satintail
IMCY	Imperata cylindrica				x	cogongrass
IPAQ	Ipomoea aquatica				x	swamp morning-glory
ISTI	Isatis tinctoria					Dyer's woad
ISRU	Ischaemum rugosum				x	ribbed murainagrass
KOSC	Kochia scoparia					Mexican-fireweed
LAPU	Lactuca pulchella			x		
LASE	Lactuca serriola	x				prickly lettuce
LATAP	Lactuca tatarica var. pulchella			x		blue lettuce
LAMA15	Lagarosiphon major				x	oxygen-weed
LAEC	Lappula echinata			x		
LAMY3	Lappula myosotis	x				

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LASQ	Lappula squarrosa	x		x		European stickseed
LEAU2	Leontodon autumnalis	x				fall dandelion
LEDE	Lepidium densiflorum	x				common pepperweed
LELA2	Lepidium latifolium			x		broadleaved pepperweed
LECH2	Leptochloa chinensis				x	Chinese sprangletop
LEVU	Leucanthemum vulgare	x	x			oxeye daisy
LISE3	Limnophila sessiliflora				x	Asian marshweed
LIPI3	Linaria pinifolia	x				pineneedle toadflax
LIVU2	Linaria vulgaris	x	x	x		butter and eggs
LOAR10	Lolium arundinaceum					tall fescue
LOPE	Lolium perenne	x				perennial ryegrass
LOPEM2	Lolium perenne ssp. multiflorum	x				Italian ryegrass
LOTA	Lonicera tatarica					Tatarian honeysuckle
LUPO2	Lupinus polyphyllus	x				bigleaf lupine
LYCH3	Lychnis chalcedonica	x				maltesecross
LYFE3	Lycium ferrocissimum				x	African boxthorn
LYJU	Lygodesmia juncea					rush skeletonplant
LYHY2	Lythrum hyssopifolia					hyssop loosestrife
LYSA2	Lythrum salicaria		x			purple loosestrife
LYVI3	Lythrum virgatum					European wand loosestrife
MADI6	Matricaria discoidea	x				disc mayweed
MAMA10	Matricaria maritima	x				
MEFA	Medicago falcata	x				
MELU	Medicago lupulina	x	x			black medick
MEMI	Medicago minima	x				burr medick
MESA	Medicago sativa	x				alfalfa
MEQU	Melaleuca quinquenervia				x	punktree
MEMA	Melastoma malabathricum				x	Malabar melastome
MEAL12	Melilotus alba	x	x			white sweetclover
MEOF	Melilotus officinalis	x	x			yellow sweetclover
MESP3	Mentha spicata	x				spearmint
MICO16	Mikania cordata				x	heartleaf hempvine
MIMI5	Mikania micrantha				x	bittervine
MIDI8	Mimosa diplotricha				x	giant false sensitive plant
MIIN80	Mimosa invisa				x	
MIPI	Mimosa pigra				x	black mimosa
MIOR	Misopates orontium					linearleaf snapdragon
MOHA2	Monochoria hastata				x	arrowleaf falsepickerelweed
MOVA	Monochoria vaginalis				x	heartshape false pickerelweed
MYMU	Mycelis muralis	x				wall-lettuce
MYSC	Myosotis scorpioides	x				true forget-me-not
MYSP2	Myriophyllum spicatum					spike watermilfoil
NATR3	Nassella trichotoma				x	serrated tussock grass
NEPA3	Neslia paniculata	x				ballmustard
ONVI	Onobrychis viciifolia					sainfoin
ONAC	Onopordum acanthium					Scotch cottonthistle
OPAU10	Opuntia aurantiaca				x	tiger-pear
OROBA	Orobanche				x	broomrape
ORLO3	Oryza longistaminata				x	longstamen rice

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ORPU13	Oryza punctata				x	red rice
ORRU	Oryza rufipogon				x	brownbeard rice
OTAL	Ottelia alismoides				x	ducklettuce
PAMI2	Panicum miliaceum					broomcorn millet
PANU3	Papaver nudicaule	x				Icelandic poppy
PASM	Pascopyrum smithii					western wheatgrass
PASC6	Paspalum scrobiculatum				x	kodomillet
PEHA	Peganum harmala					harmal peganum
PECL2	Pennisetum clandestinum				x	kikuyugrass
PEMA80	Pennisetum macrourum				x	African feathergrass
PEPE24	Pennisetum pedicellatum				x	Kyasuma grass
PEPO4	Pennisetum polystachyon				x	mission grass
PHAR3	Phalaris arundinacea	x	x			reed canarygrass
PHCA5	Phalaris canariensis	x				annual canarygrass
PHPR3	Phleum pratense	x				timothy
PLLA	Plantago lanceolata	x		x		narrowleaf plantain
PLMA2	Plantago major	x		x		common plantain
POAN6	Poa angustifolia					
POAN	Poa annua	x		x		annual bluegrass
POCO	Poa compressa	x				Canada bluegrass
POGL	Poa glauca	x				glaucous bluegrass
POPA2	Poa palustris	x				fowl bluegrass
POPR	*Poa pratensis	x				Kentucky bluegrass
POPRI2	Poa pratensis ssp. irrigata					spreading bluegrass
POSU	Poa subcaerulea	x				
POTR2	Poa trivialis	x				rough bluegrass
POAV	Polygonum aviculare	x				prostrate knotweed
POCO10	Polygonum convolvulus	x		x		black bindweed
POCU6	Polygonum cuspidatum	x	x			Japanese knotweed
POLA4	Polygonum lapathifolium	x				curlytop knotweed
POPE3	Polygonum persicaria					spotted ladysthumb
POAN5	Potentilla anserina	x				
POGR9	Potentilla gracilis					slender cinquefoil
PONO3	Potentilla norvegica	x				Norwegian cinquefoil
PRAL11	Prosopis alpataco				x	
PRAR6	Prosopis argentina				x	
PRAR4	Prosopis articulata				x	
PRBU2	Prosopis burkartii				x	
PRCA9	Prosopis caldenia				x	
PRCA10	Prosopis calingastana				x	cusqui
PRCA11	Prosopis campestris				x	
PRCA12	Prosopis castellanosii				x	
PRDE4	Prosopis denudans				x	
PREL5	Prosopis elata				x	
PRFA2	Prosopis farcta				x	Syrian mesquite
PRFE2	Prosopis ferox				x	
PRFI4	Prosopis fiebrigii				x	
PRHA4	Prosopis hassleri				x	
PRHU3	Prosopis humilis				x	

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PRKU2	Prosopis kuntzei				x	
PRPA4	Prosopis pallida				x	kiawe
PRPA10	Prosopis palmeri				x	
PRRE2	Prosopis reptans				x	tornillo
PRRO4	Prosopis rojasiana				x	
PRRU4	Prosopis ruizlealii				x	
PRRU5	Prosopis ruscifolia				x	
PRSE5	Prosopis sericantha				x	
PRST3	Prosopis strombulifera				x	Argentine screwbean
PRTO3	Prosopis torquata				x	
PRVE	Prosopis velutina				x	velvet mesquite
PRPA5	Prunus padus	x	x			European bird cherry
RAAC3	Ranunculus acris	x				tall buttercup
RARE3	Ranunculus repens	x				creeping buttercup
RARA2	Raphanus raphanistrum			x		wild radish
RASA2	Raphanus sativus					cultivated radish
ROAU	Rorippa austriaca			x		Austrian yellowcress
ROSY	Rorippa sylvestris					creeping yellowcress
ROCO6	Rottboellia cochinchinensis				x	itchgrass
RUDI2	Rubus discolor	x				Himalayan blackberry
RUFR80	Rubus fruticosus				x	shrubby blackberry
RUMO4	Rubus moluccanus				x	eelkek
RUAC3	Rumex acetosella	x				common sheep sorrel
RUCR	Rumex crispus	x				curly dock
RULO2	Rumex longifolius	x				dooryard dock
RUOB	Rumex obtusifolius	x				bitter dock
SASP	Saccharum spontaneum				x	wild sugarcane
SASA7	Sagittaria sagittifolia				x	Hawaii arrowhead
SAIB	Salsola iberica			x		
SATR12	Salsola tragus			x		prickly Russian thistle
SAVE6	Salsola vermiculata				x	shrubby Russian thistle
SAAE	Salvia aethiopis					Mediterranean sage
SAAU10	Salvinia auriculata				x	
SABI9	Salvinia biloba				x	giant salvinia
SAHE7	Salvinia herzogii				x	giant salvinia
SAMI7	Salvinia minima				x	water spangles
SAMO5	Salvinia molesta				x	kariba-weed
SAOF4	Saponaria officinalis	x	x			bouncingbet
SCMA8	Schoenoplectus maritimus					cosmopolitan bulrush
SCPA4	Scirpus paludosus					
SEJA	Senecio jacobaea	x	x			stinking willie
SEVU	Senecio vulgaris	x				old-man-in-the-Spring
SEPA82	Setaria pallidifusca				x	
SEPU8	Setaria pumila				x	yellow bristlegrass
SEPUP	Setaria pumila ssp. pallidifusca				x	yellow bristlegrass
SEVI4	Setaria viridis	x				green bristlegrass
SIDI4	Silene dioica	x				red catchfly
SILA21	Silene latifolia	x				bladder campion
SILAA3	Silene latifolia ssp. Alba	x				bladder campion

CODE	Latin Name	Recorded in Alaska	Alaskan invasive	state noxious	federal noxious	Common Name
SINO	Silene noctiflora	x				nightflowering silene
SIVU	Silene vulgaris					maidenstears
SIAL5	Sinapis alba	x				white mustard
SIAR4	Sinapis arvensis			x		charlock mustard
SIAL2	Sisymbrium altissimum	x				tall tumblemustard
SOCA3	Solanum carolinense			x		Carolina horsenettle
SOEL	Solanum elaeagnifolium					silverleaf nightshade
SONI4	Solanum nigrum					
SOTA3	Solanum tampicense				x	scrambling nightshade
SOTO4	Solanum torvum				x	turkey berry
SOVI2	Solanum viarum				x	tropical soda apple
SOAR2	Sonchus arvensis	x	x	x		field sowthistle
SOAU	Sorbus aucuparia					European mountain ash
SOHA	Sorghum halepense					Johnsongrass
SPER	Sparganium erectum				x	simplestem bur-reed
SPAL	Spartina alterniflora					smooth cordgrass
SPAR	Spergula arvensis	x				corn spurry
SPRU	Spergularia rubra	x				red sandspurry
SPAL3	Spermacoce alata				x	winged false buttonweed
STME2	Stellaria media	x				common chickweed
STRIG	Striga				x	witchweed
SYOF	Symphytum officinale	x				common comfrey
TACA8	Taeniatherum caput-medusae					medusahead
TAVU	Tanacetum vulgare	x	x			common tansy
TALA2	Taraxacum laevigatum					rock dandelion
TAOF	Taraxacum officinale	x				common dandelion
TASC	Taraxacum scanicum					
THAR5	Thlaspi arvense	x				field pennycress
TRDU	Tragopogon dubius	x	x			yellow salsify
TRTE	Tribulus terrestris					puncturevine
TRPR5	Tridax procumbens				x	coatbuttons
TRAU2	Trifolium aureum					golden clover
TRHY	Trifolium hybridum	x				alsike clover
TRPR2	Trifolium pratense	x				red clover
TRRE3	Trifolium repens	x				white clover
TRIN11	Tripleurospermum inodorum	x				
TRAE	Triticum aestivum	x				common wheat
ULEU	Ulex europaeus					common gorse
URPA	Urochloa panicoides				x	panic liverseed grass
VETH	Verbascum thapsus					common mullein
VESE	Veronica serpyllifolia	x				thymeleaf speedwell
VICR	Vicia cracca	x	x	x		bird vetch
VIVI	Vicia villosa	x	x			winter vetch
VITR	Viola tricolor	x				johnny jumpup
ZYFA	Zygophyllum fabago					Syrian beancaper
SUM		**142**	**31**	**30**	**102**	

*NOTE: Species names preceded by asterisk may be native but have adventive characteristics or are of ambiguous origin (eg. both native and introduced populations)

APPENDIX 2

SOIL SAMPLE ANALYSIS QUOTES

AFES Soil Lab
533 E Fireweed
907-746-9482

Calob Slemmons					
Kenai Nat. Wildlife Refuge					
Date Completed:	Total # of samples		Soil	Tissue	
					TOTAL $
Sampling Handling & Preparation	1		17.31	0.00	17.31
Extractions	0		0.00	0.00	0.00
Digestions	0		0.00	0.00	0.00
Total N & C	1		4.00	0.00	4.00
Standard Soil Test	0		0.00	0.00	0.00
(pH,Buffer pH,Ammonium,Nitrate,					
Phosphorus,Potassium)					
Standard Feed analysis	0		0.00	0.00	0.00
(C.P.,P,K,Ca,ADF, NDF,DM)					
Ammonium (NH_4)	0		0.00	0.00	0.00
Nitrate (NO_3)	0		0.00	0.00	0.00
Nitrite (NO_2)	0		0.00	0.00	0.00
Extra Elements (ICP)	0		0.00	0.00	0.00
Multiply # of samples by # of elements					
Crude Fat	0		0.00	0.00	0.00
pH	1		3.32	0.00	3.32
Buffer pH	0		0.00	0.00	0.00
E.C.	0		0.00	0.00	0.00
Texture	1		8.21	0.00	8.21
CEC	0		0.00	0.00	0.00
% Moisture/Dry Matter	0		0.00	0.00	0.00
ADF	0		0.00	0.00	0.00
NDF	0		0.00	0.00	0.00
ADF + Lignin (H2S04 method)	0		0.00	0.00	0.00
ADF + Lignin (Permanganate method	0		0.00	0.00	0.00
Cellulose(ADF,Lignin)	0		0.00	0.00	0.00
Silica(ADF,Lignin,Cellulose)	0		0.00	0.00	0.00
LOI/Total Ash	0		0.00	0.00	0.00
Non routine analysis $23.05/hr	0				0.00
			SUBTOTAL		32.84
	SOIL	TISSUE			
Received dried	6.00	0.00		Subtract	6.00
ground or seived					
				TOTAL	26.84

Brookside Laboratories, Inc.
308 S. Main St.
New Knoxville, OH 45871
Tel: (419) 753-2448
Fax: (419) 753-2949

QUOTATION

Company Name: Kenai National Wildlife Refuge
Address: PO Box 2139
Soldotna, AK
Telephone _____ Fax _____

Client Number: 44576
Quotation Number: 1475
Date of Quotation: 04/27/2005
Quotation By: Mark Flock

We are pleased to submit our Quotation for the service listed below. The prices are firm from 04/27/2005 to 04/27/2006 and based on the assumption that they will be sent FOB to Brookside Laboratories, Inc. Payment for the testing based on your acceptance will be due 30 days from the report date. A service charge of 1% will be added to accounts not paid within 30 days. This quote will be evaluated after 04/27/2006

Service/Test		Unit Price	Quantity	Total Fee
S112	NITROGEN (TOTAL)	$9.00	1	9.00
S132	BULK DENSITY (From OM)	$0.50	1	0.50
S138	TOTAL CARBON	$0.00	1	0.00
S171	Physical Analysis (Hydrometer)	$9.00	1	9.00
S205	pH 1:1 WATER	$2.50	1	2.50
Total Service Fee				$21.00

Contract for: Kenai National Wildlife Refuge.
Total Carbon and Total Nitrogen = $9.00 (when ran together).
May pay by either credit card or Purchase Order Number.
Contact for billing is: Marta Gren e-mail: marta@blinc.com

Please Complete Below

Project Contact: Caleb Slemons PO# _____

Payment Method _____ Check _____ Credit Card
Number _____
Expiration Date _____

APPENDIX 3

POINT-INTERCEPT
DATA FORM

MODIFIED LINE-INTERCEPT ALONG FOUR 5-M TRANSECTS (2005)

DATE _____ OBSERVERS _____

SITE ID _____ PAGE 1 OF _____ AVC _____

UTMs_____

SPECIES	NORTH		EAST		SOUTH		WEST	
	1m	2m	1m	2m	1m	2m	1m	2m
NO PLANTS RECORDED								
BARE GROUND								
ROCK								
LITTER								
WOOD (>25 mm, dead)								
ASH/CHARCOAL								
STANDING WATER								
SNOW/ICE								
BASAL COVER (include moss, lichens)								

DIRECTIONS: tally all species that hit vertical rod (placed to immediate left of cord) by 1-m strata (only one hit per species); use 10-pt system; basal cover should be recorded in both substrate and species categories.

MODIFIED LINE-INTERCEPT ALONG FOUR 5-M TRANSECTS (2005)

PLOT ID _____ PAGE 2 OF _____

SPECIES	NORTH		EAST		SOUTH		WEST	
	1m	2m	1m	2m	1m	2m	1m	2m

LIST OTHER SPECIES RECORDED WITHIN 5 m RADIUS

LIST VOUCHER SPECIMEN IDs

APPENDIX 4

LANDCOVER
DATA FORM

2005 BAER INVASIVE PLANT MONITORING PROJECT GROUND SITE DESCRIPTION FORM

Air Photo #: _ Polygon: Landcover class name:

Date: Surveyors: Photos: Roll number: Frame Number:

Lat: Long: **WP:** Error ± Elevation (ft / m):

Slope (0-100 degrees): Aspect (0-360 degrees):

	Air	Ground	Height (ft)
Needleleaf			
Broadleaf			
Tall shrub (>5 ft)			
Low (8" > 5 ft)			
Dwarf (<8 inches)			
Forb			
Grass			
Sedge			
Moss			
Lichen			
Bare ground			
Water			
Tussocks			

Unvegetated

%	**Surface :**
	Water
	Bare soil
	Bedrock
	Litter, duff
	Wood (>1 cm)
	Sand (0.1-2mm)
	Large rocks (cobbles, boulders > 10 cm)
	Small rocks (gravel, 0.2-10cm)
	Other (describe):

Soils: pH _____

Texture _____

Depth (ft) _____

Water table _____

Depth to permafrost_____

Soils Schematic

Landform:

Biome:

Alpine

Subalpine

Boreal

Bog

Herb meadow

Tussock

Riparian

COMMENTS

Hydrologic Regime

Dry

Mesic

Wet

Aquatic

Species		% Cover	Height (ft)	Comments (bottom branches)	DBH (")